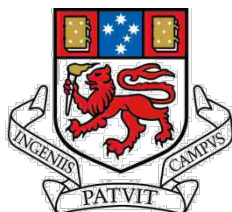


Structural and Thermal Investigation of the Eneabba Region of the Perth Basin, Western Australia.

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**A research thesis submitted in partial fulfillment of the requirement of a
Bachelor of Science with Honours.**

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Project Sponsor:



School of Earth Sciences, University of Tasmania
Australia, November 2010

Declaration of own work

This thesis is my own work and contains no material which has been accepted for the award of any other degree or diploma in any tertiary institution, and to the best of my knowledge, contains no material previously published by any other person, except where due reference is made in the text of the thesis.

Nick Jervis-Bardy *B.Sc.(Adelaide)* November 2010

Abstract

A structural and thermal investigation was undertaken on an area centred on exploration permits currently held by Granite Power Pty Ltd, in the vicinity of Eneabba, in the north Perth Basin using a combination of potential field geophysics, petrophysical and thermal property measurements followed by 1D and 2D thermal modelling.

Petrophysical results show that the Kockatea Shale is the primary thermal insulator within the area of investigation, and 1D modelling of drill holes show that the geotherm is strongly deflected by this unit. The heat generation of basement samples is greater than the sedimentary sequence indicating a possible heat source at depth. Shale samples also exhibit elevated heat generation values.

Gravity data is characterised by large gravitational gradients within the area of investigation, associated primarily with variation in depth to the basement sequence due to major fault structures. Magnetic response of the basin is subdued in a manner consistent with the presence of a thick sedimentary sequence. Forward modelling of the potential field data, constrained by interpreted seismic data, suggests possible changes in lithology within the basement across the area of investigation.

2D finite element modelling of the thermal response of the basin sequence illustrates highest thermal gradients within the Kockatea Shale, and shows a coupling between variations in depth to basement, and depth to isotherms. Models show possible enhanced geothermal system targets within basement rock in the western portion of the area. Hot sedimentary aquifer system targets are also present within the Permian sequence in most of the eastern portion of the area of investigation where the sedimentary sequence is thicker than 4km.

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Appendix G.1: 1D and 2D Thermal Model Comparisons